

TWO CASES OF CESOPHAGEAL DIVERTICULUM, WITH REMARKS.

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CASE I.—I first saw H. M. H., Esq., a gentleman of fifty-three, on November 24, 1893, in consultation with Dr. F. I. Knight. He had been referred to us by Dr. E. F. Cushing, of Cleveland, Ohio. Mr. H. had suffered from malaria and digestive disturbances since service in the United States navy during the Civil War. The family and personal history were good. In June, 1890, he had some pharyngeal trouble accompanied by "hemming" and clearing of the throat. For some six or eight months he had some difficulty in swallowing solids. Dr. Knight found at this time that the pharynx was brown and cicatrized. There was little, if any, resistance to the passage of a bougie of considerable size. Dr. Knight thought that the symptoms might be owing to the condition of the lower pharynx. About a year after this time Dr. Bosworth discovered an cesophageal pouch.

Dr. Cushing, in a letter to Dr. Knight in 1893, wrote: "Mr. H. has an cesophageal diverticulum of uncertain age. It has caused symptoms for about four years. About three years ago Dr. Bosworth discovered its existence, and since then Mr. H. has been under my observation. It is in the left side of the neck, with its orifice at about the level of the cricoid cartilage. It fills with the first food swallowed at a meal, but the distended pouch does not further interfere with deglutition. The pouch can be partly emptied by a voluntary muscular effort soon after eating. It can then be swabbed clean by the patient with a cotton-tipped bougie. In the past three years the diverticulum has increased in depth about one-half, and perhaps doubled its capacity. It will now hold about one ounce. I have advised, whenever the question of operation comes up, that it should be discussed by you and Dr. Richardson. For the past six months there has been no treat-

ment except to keep the pouch clean. Before that time a large-sized bougie was passed, in the hope of obliterating the sac, but without effect. Of late it has been impossible to get any bougie past the sac. The history of progressive interference with deglutition makes me think that the question of operation ought to be thoroughly discussed."

Mr. H. himself stated that there had never been any injury to the throat. "The first raw oyster will lodge in the sac; the second will go down. The difficulty in passing the bougie is that it will go right into the sac. Dr. Cushing used to pass the bougie himself. After a week or two I learned to pass it; but for some reason I stopped it, and did not use the bougie for some little time. When I attempted to use it again, I could not pass it. There is no pain except when I try to pass the bougie. There has been some loss of flesh, but not very much,—perhaps ten pounds."

The general condition of the patient was excellent. In passing the olive-tipped probang an obstruction was met nine and one-quarter inches from the upper incisors. I could not make out exactly the opening into the œsophagus, but thought it to be at the junction of the œsophagus with the pharynx, and a little to the left. The fundus of the sac would be, in a man of the patient's height, a little below the level of the clavicle. No tumor could be felt, even when the sac was distended with food. The olive-tipped probang could be felt as it was passed up and down. When at the bottom of the pouch, the olive tip could not be felt; and while passing there was no way of telling whether it was in the œsophagus or in the pouch.

The patient stated that he had learned the art of swallowing without choking; and yet, at times, in spite of every care, he had been obliged suddenly to leave the table on account of violent choking sensations. In swallowing liquids, he would at first take a single small mouthful; after that he could swallow anything. If he tried to take several mouthfuls first, he would choke,—the obstruction probably interfering with the œsophageal muscles.

After a careful consideration of the case, it was decided that an operation for the removal of the diverticulum ought, in the near future, to be performed. My opinion was embodied in a letter to Dr. Cushing, dated December 12, 1893, as follows:

"This lesion does not as yet seem to cause him serious inconvenience or disability. At least, he says that, if it is not

going to be any worse, he can get along very well. The tendency of these cesophageal diverticula is, of course, to get worse, and, owing to decomposing food or some other cause, to set up serious trouble. I see no reason why an external cesophagotomy should not be performed and the diverticulum removed. I should try—if at the close of the operation there seems to be no objection—the immediate suture of the cesophagus. The external wound ought, I think, to be loosely packed with gauze for a day or two before it is allowed to close. I dare say that the time will come when we shall close the cesophagus and the neck immediately after these operations; but there is so much danger of infecting the wound when the cesophagus is opened, that I should not think this a safe procedure at present.”

I did not see Mr. H. again until May 26, 1898. In the mean time he had consulted many prominent surgeons abroad. He was advised by Butlin to have the diverticulum removed. Butlin refers to his case in the *British Medical Journal*, 1898, Vol. i, page 8, as follows:

“CASE VI.—A gentleman aged fifty-seven, staying in London, was brought to me by his doctor, Dr. Edward F. Cushing (Cleveland, Ohio), for my opinion on the desirability of removing a pressure pouch from his cesophagus on July 15, 1897. In the year 1891 he began to experience annoyance from the return of fragments of food from time to time. The difficulty has slowly grown greater, but he had not become thinner, and his health was excellent. He was able to demonstrate a pouch in the usual place with ease; for he was a very intelligent man, and had studied the whole subject of cesophageal pouches with great attention. He could press water, which he had just swallowed, out of the pouch, or, rather, empty it out by leaning forward; could pass an instrument into the pouch (a distance of about nine inches from the teeth) and press solid materials out of the same. But there was no obvious bulging of the neck after swallowing.

“I believe this gentleman has made up his mind to have the pouch removed, if he has not already undergone the operation.”

I saw Mr. H. for the second time on May 26, 1898, as I have said before. Since 1893 the symptoms had remained, on the whole, the same. There had been some increase in the dysphagia, and choking at table had been more troublesome, so that he had been obliged to avoid public dining-rooms and to give up social

dinners. He had become very skilful in keeping the pouch dry and clean. His general health had not suffered seriously.

I was able to pass the probang into the pouch without difficulty; in fact, it was impossible to get by it. No evidence as to the breadth of the diverticulum could be obtained by physical examination. No tumor could be felt, whether the pouch was empty or full. There was no way of telling whether it was situated more to one side of the median line than to the other. The path taken by the probang was precisely that of the normal *oesophagus*.

The history and physical signs clearly warranted the diagnosis of *pulsion diverticulum*.

It was probable, from the absence of local inflammation, that the pouch was non-adherent, and that, like the *oesophagus* itself, it would be found loosely connected with the deep structures of the neck and posterior mediastinum.

The dangers to be anticipated from excision were those of sepsis. Because of the impossibility of sterilizing the pouch, the patient could hardly escape a slight wound infection. He would run the danger, also, of those deep cervical phlegmons which are occasionally seen after external *oesophagotomies* for the removal of foreign bodies. Unlike cases of impacted foreign bodies, however, in many of which the peric*oesophageal* infections are at the time of intervention already under way, the present case presented no mucous abrasions, no infected areas. There was only the danger of wound infection at a time when there would be every opportunity for cleansing and for disinfection. The danger of infection was, moreover, slight, for the patient had kept the pouch clean by frequent wiping; there had been no putrefaction of retained food. The only source of wound contamination would be a normal *oesophagus* and a well-cleansed diverticulum.

As well as could be determined by similar cases, the course of this lesion, left to itself, would be progressive. As a result of the gradual dilatation of the pouch, the patient would suffer from a constantly increasing dysphagia. Moreover, there would always be the possibility of local phlegmons and general septicæmia. The dysphagia itself might become excessive, and require gastrostomy. Finally, with advancing years, the dangers from surgical intervention would be greatly augmented: for not only would the pouch be larger and in relation with deeper and more impor-

tant structures, but it might, by inflammation, become adherent to them. Moreover, to the increased difficulties of the operation would be added the dangers of enfeebled powers of resistance. An operation was therefore recommended.

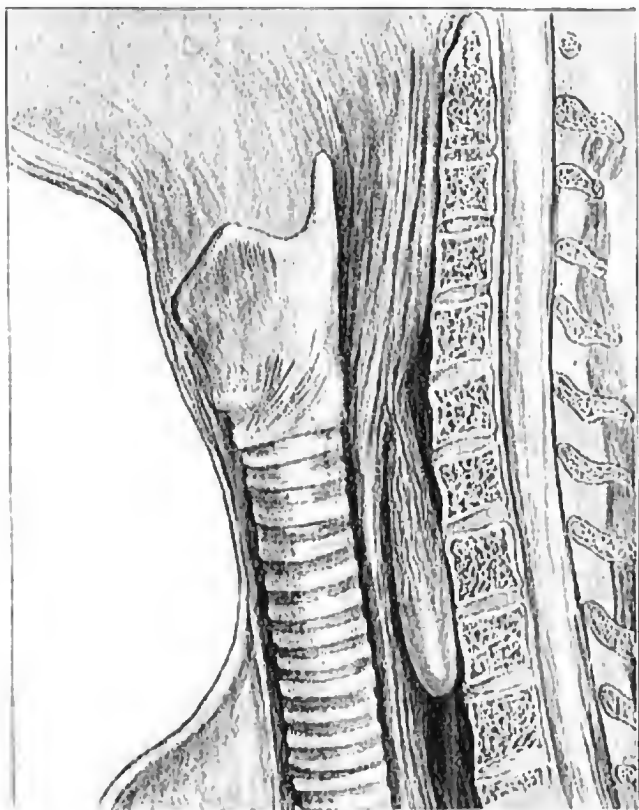


FIG. 1.—Situation, shape, length, and depth of the diverticulum when first exposed by dissection. Case I.

The operation was performed at St. Margaret's Hospital on June 1, 1898. I was assisted by Drs. Brewster and Jones and by Miss Durling. Ether was given by Dr. Cushing, of Cleveland.

Dr. Brewer, of New York, and Dr. J. C. Munro, of Boston, were present.

To keep the mouth and throat dry, by Dr. Cushing's suggestion atropia was given hypodermically before etherization. This plan worked admirably. The œsophagus was exposed by a cut about four inches in length along the anterior border of the sternocleido-mastoid. To get a clear view of the field, the anterior belly

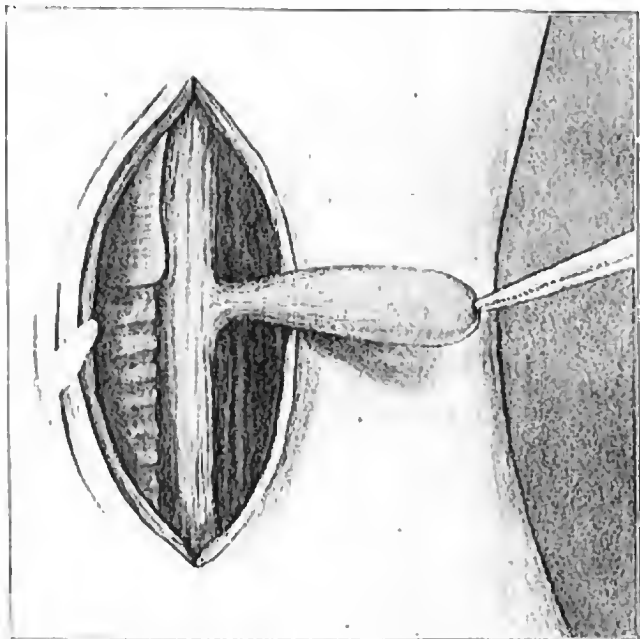


FIG. 2.—Diverticulum freed from its attachments and delivered from the wound.
Case I.

of the omohyoid was cut. Especial care was taken to avoid the recurrent laryngeal nerve and the thoracic duct. The great vessels at the base of the neck stood out prominently at the lower angle of the dissection, which was throughout so dry as not to require the application of a single ligature. At first no pouch could be detected. Careful exploration with the blunt dissector

between the œsophagus and the vertebrae, however, finally revealed it. It was situated behind the œsophagus, and extended downward nearly to the aortic arch (Fig. 1). The presenting surface was grasped with forceps and drawn to the left. The attachments of the pouch were, as anticipated, loose, and the sac, easily separated with blunt instruments, yielded to moderate trac-

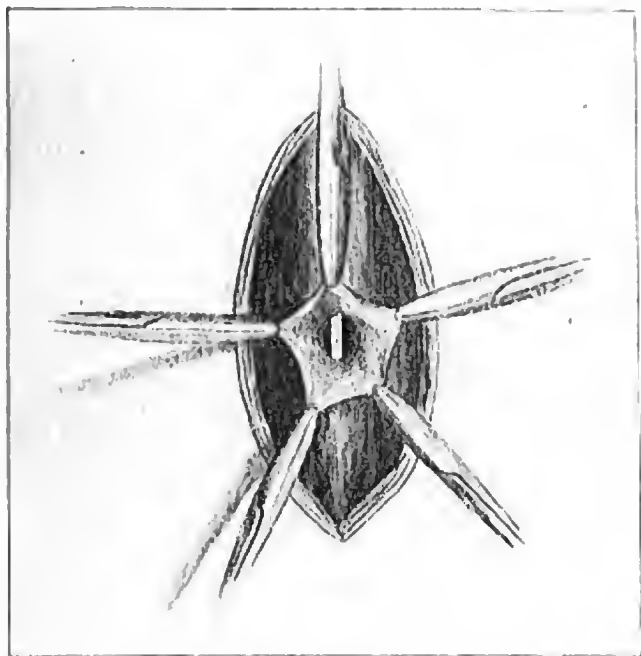


FIG. 3.—Isthmus of diverticulum after excision of its main portion. The cut margin is grasped by pressure-forceps. In the œsophageal opening the stem of the probang is visible. Case 1.

tion, until the whole pouch was delivered and projected from the wound at right angles with the œsophagus, to which it remained attached by only its base (Fig. 2). Even at this time it was difficult to make out exactly the opening of the pouch and its relations with the œsophagus. Dr. Brewer therefore passed a probang into the pharynx, beyond which it was easy, with the finger

in the wound, to deflect it by the opening of the pouch. The fundus of the pouch was next opened, and the edges of the opening were grasped with hæmostatic forceps. By applying four or five forceps, and by spreading this opening (Fig. 3), we could determine the exact extent of the interior of the pouch, the size of its mouth, its relation to the pharynx and the cesophagus. The base of the pouch was at the beginning of the cesophagus, in its pos-

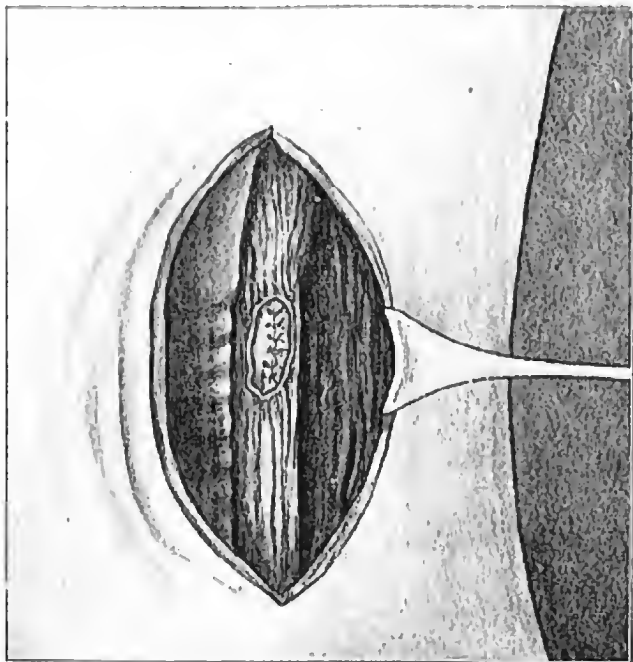


FIG. 4.—Shows the mucous lining of the base of the sac inverted and united by interrupted Lembert sutures of catgut. Case 1.

terior wall. The upper margin of the opening was contiguous to the pharynx, if not actually between the fibres of the lower constrictor. The walls of the pouch were thick at the base. Towards the fundus they became gradually thinned. The pouch seemed to be a prolongation of the mucous membrane between and through the muscular fibres of the pharynx and the cesophagus.

At the fundus its walls were translucent,—almost transparent. The base was thickened and seemed to be grasped between longitudinal muscular fibres. These longitudinal fibres could be seen passing up and around the isthmus of the diverticulum, gradually being merged and lost in the translucent portion. About the constricted base, and continuous with the cesophagus, were numerous veins circularly arranged, from which were given off towards the

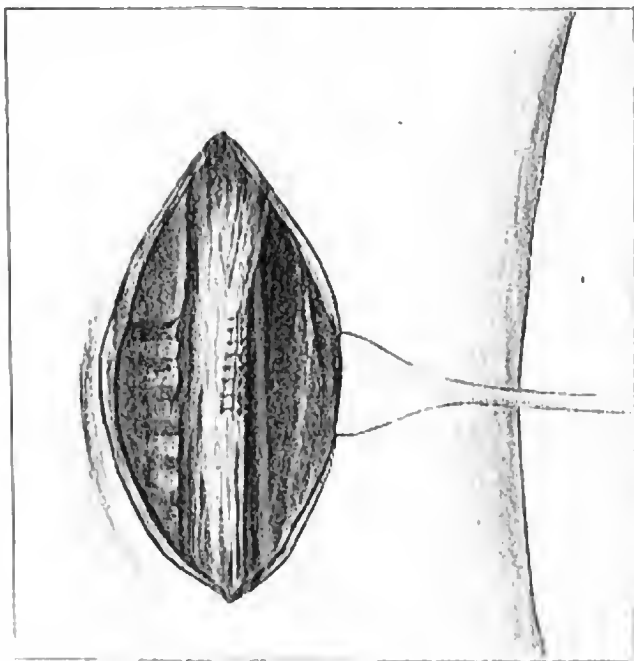


FIG. 5.—Shows the external layers of the cesophagus closed by interrupted Lembert sutures of silk. Case I.

diverticulum many small branches. The interior of the diverticulum was perfectly smooth. The tip of the index-finger could be thrust into the cesophagus through the circular base of the pouch, which was just about large enough to admit it. The pouch was removed by cutting through its isthmus close to the pharyngeal opening. The mucous membrane was inverted into

the œsophagus and fastened together by a few interrupted fine catgut sutures (Fig. 4). The other layers were also inverted and fastened by interrupted Lembert stitches of silk (Fig. 5). The external wound was closed, except at the centre, where a space was left through which a small piece of sterile gauze led to the line of sutures in the œsophagus.

The patient bore the operation extremely well. The temperature was practically normal after the operation, though on the third day it reached 100.6° F. The pulse was never above 100. The greatest discomfort was from the expectoration of mucus, and the greatest pain from swallowing. The difficulty in swallowing gradually disappeared. The packing was removed on the fourth day. The stitches were out on the seventh day. The wound was entirely healed on the tenth day. The patient has been perfectly well ever since. There has been no difficulty in swallowing and no discomfort whatever.

CASE II.—Mrs. D. W. M., aged fifty-four, came to me, April 25, 1899, complaining of great difficulty in swallowing. Small pieces of solid food would remain in her throat and be regurgitated even as late as twenty-four hours after deglutition. The only throat disease that she ever had was diphtheria, twenty-five years ago. "As soon as I begin to eat, this place in my throat fills with liquid or solid food. What nourishment I get is what passes by after it is full. It is a great burden. I can eat hardly anything except bread. I cannot eat potatoes or meat of any kind. Sometimes it is hours before I throw up what I have eaten."

The symptoms began at the menopause. The first indication that she remembered was that it "tired her to swallow." She would have to try hard to get food by a certain place in the throat. It was particularly difficult to swallow medicines, and she would have to take them in milk. The first thing that she found she could not swallow were oysters. Pills would lodge and be regurgitated, and so would beans. There had been a loss of nine pounds during the past winter, the weight falling from 102 to 93 pounds.

Passage of the olive-tipped probang was arrested seven inches from the upper incisor teeth. It was easy to pass the probang thus far, but impossible to pass it farther. No tumor could be detected in the neck. There was no pain or tenderness expressed during the manipulations of this examination. The patient was emaciated, but of good color and strength. The heart, lungs, and kidneys were healthy.

The diagnosis in this case seemed reasonably certain, though not as positive as in the preceding one. The regurgitation of food was a less marked, perhaps a less well observed, symptom. The persistent and invariable filling up of the sac before food could pass was not so prominent a feature, though it undoubtedly occurred as often as food was taken.

The question of organic stricture arose in the consideration

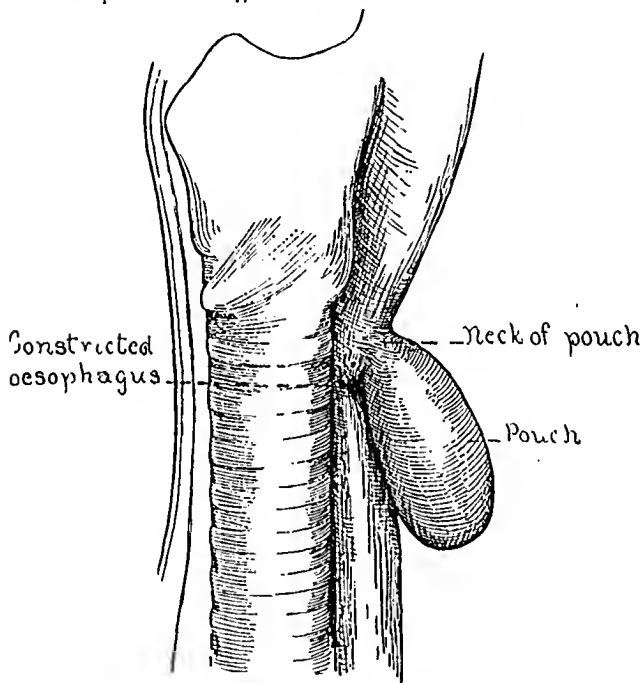


FIG. 6.—Situation, shape, and size of diverticulum in Case II.

of operative treatment. It could not be positively asserted that the obstruction was due to a pouch. On the other hand, the duration of the symptoms seemed to rule out obstructions of malignant origin. A benign stricture of the esophagus, with dilatation just above the plane of constriction, would explain all the symptoms.

Gastrostomy was considered, as was also inversion of the pouch and suture according to Girard's method,—an operation

which will be described later. This operation was, however, deemed impossible, as it was apparent that, even if inversion could be successfully accomplished, the lumen of the œsophagus would undoubtedly be practically closed. Excision of the pouch was therefore decided upon, and on May 11, 1899, the operation was performed.

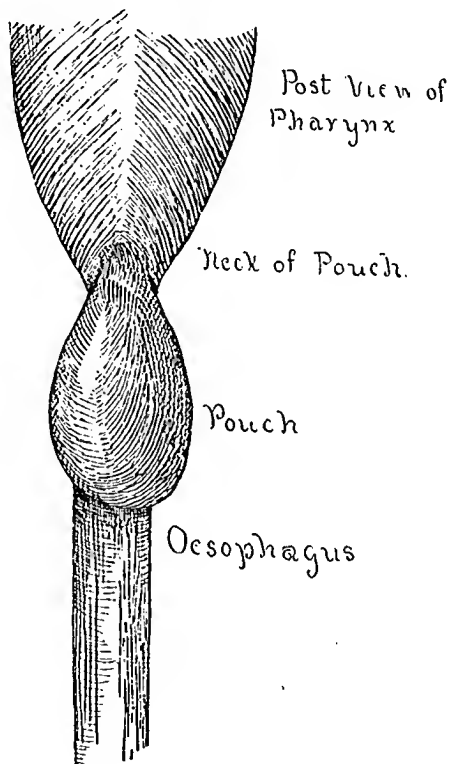


FIG. 7.—Same: posterior view. Case II.

The œsophagus was readily found by a dissection of the neck through an incision five inches in length along the anterior border of the left sterno-cleido-mastoid muscle. No important structure was divided except the anterior belly of the omohyoid muscle. A pouch was discovered behind the upper portion of the œsophagus.

The base of the pouch was attached at the posterior surface of the beginning of the cesophagus and the lower border of the pharynx (Figs. 6 and 7). The fundus of the pouch was easily separated from the prevertebral space, and withdrawn from the wound at a right angle with the cesophagus. The pouch was opened and explored, as in the preceding case. With the finger in the pouch, the probang introduced through the mouth could be guided into

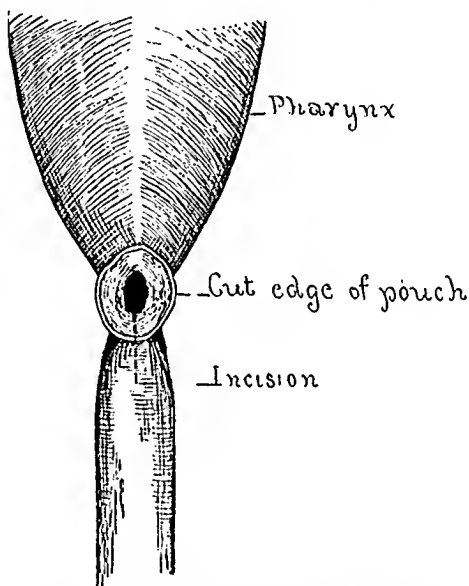


FIG. 8.—Case II. Showing posterior view of pharynx and cesophagus. The pouch has been cut off, leaving a circular margin about the sac. The dotted line shows incision through margin of pouch, neck of pouch, and constriction of the cesophagus.

the cesophagus. The index-finger was next passed carefully through the neck of the pouch into the cesophagus. A constriction lined with friable mucous membrane was here found. Passage of the finger through this constricted portion resulted in a longitudinal tear, which seemed to involve the greater part of the lining. The probang, after being passed by this constriction, could at one time be introduced into the stomach; at another it

could not. It seemed at the time to meet with an obstruction lower down. The parts were repeatedly examined to determine the exact shape, size, and position of the pouch, and its relations with the cesophagus and pharynx.

The pouch was smaller than that in the preceding case. It was about the size of half a hen's egg. The opening into the cesophagus was sufficient to admit easily the tip of the index-finger. The cesophagus just below the opening of the pouch had the diameter of a lead-pencil; externally, from the diverticulum

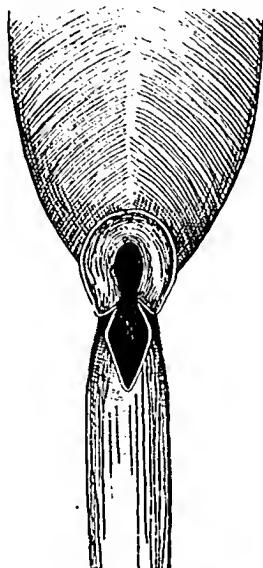


FIG. 9.—Case II. Showing incised pouch, neck, and cesophagus.

to a point as far as the dissection extended, it was perfectly normal.

Although the mucous membrane seemed normal, yet it was not, for it gave way under the gentlest pressure of the finger. There was a constriction at that plane, caused either by real pathological changes or by disuse. The tear in the cesophagus was converted into a longitudinal slit by extending the incision downward in the posterior wall through the lower border of the isthmus of the sac, and through the constriction (Figs. 8 and 9).

Fearing the formation of a permanent organic constriction at the site of the laceration, a portion of the pouch was utilized to enlarge the diameter of the contracted cesophagus. To accomplish this end, a considerable circular margin was left about the opening of the sac (Fig. 8). The lower portion of the margin was brought downward and placed in the gap made by the divided posterior surface of the narrowed cesophagus (Fig. 9).

The effect of this procedure was to increase the lumen of the cesophagus by a small area of tissue taken from the pouch (Fig. 10). The transposed tissues were taken, to be sure, from an abnormal sac; yet it was desirable that this tissue should be thin and elastic rather than thick and rigid. The subsequent effect of this plastic operation showed its advantage, for at no time was there the least obstruction to the passage of the prohang into the stomach.

After making as good a joint as possible at the beginning of the cesophagus, I closed the mouth of the pouch by inverting the margins remaining after excision, uniting them by interrupted Lembert sutures. The joint, as a whole, was not as satisfactory as in the preceding case, owing to the difficulty of adapting the surfaces to each other. Leakage was expected to take place, and the external wound was therefore only partly closed, gauze wicks being left in contact with the line of suture and emerging from the external wound.

The operation was difficult. The patient bore it well, however, and came out of the anaesthesia in good condition. There was practically no constitutional disturbance. As was expected, leakage took place from the cesophagus, the wound soon giving escape to about half the quantity swallowed. The patient was able, however, to take into her stomach sufficient to keep her well nourished. The wound closed very slowly. The patient went home on July 29. At this time there was a comparatively small loss of food through the wound.

I have received the following note from this patient since her return home:

MANCHESTER, N. H., September 4, 1899.

DR. M. H. RICHARDSON.

DEAR SIR,—I am pleased to tell you that I am gaining every day. I can eat almost all kinds of solid food, and do not lose any through the wound. I lose very little liquid. I have gained four and a half pounds since I came home.

At the present time the wound is closed and she is in perfect health. Deglutition is normal.

This case presents several unusual features which seem interesting in connection with the etiology and diagnosis, and valuable in connection with the treatment. The pouch differed materially in shape and size from that of Case I. Instead of being deep and narrow, it was shallow and broad; its walls were thick, there was no thinning at the fundus, and there was no translucency. It seemed more like a simple dilatation of normal cesophageal wall above a constriction. Yet it was not such a dilatation, for only the posterior wall was affected, and only a portion of that. Moreover, the opening into the cesophagus was small, admitting only the index-finger.

The most interesting feature of this case was the condition of the cesophagus just below the opening of the pouch. This has already been described. The only evidence of constriction was in the extensive laceration of the cesophageal wall at this level caused by the introduction of the finger. Though the finger was very carefully introduced through the mouth of the sac into and down the cesophagus, this procedure resulted, as I have said before, in such extensive tearing of the mucous membrane that it seemed at first that there was no mucous lining whatever left. Such an injury to the normal cesophagus would, of course, be impossible, for it can be dilated to an excessive degree without laceration. Indeed, it may be said that round and smooth bodies, large enough to become firmly impacted, do not cause injury unless the pressure is prolonged for days, and usually not even then. I was entirely at a loss to account for the condition of the cesophagus, and to estimate its probable influence in causing the pouch. There was nothing in the history to throw any light upon the case excepting, perhaps, the attack of diphtheria twenty-five years before. This disease may have caused the formation of scar-tissue in the lower pharynx and upper cesophagus, the giving way of part of which resulted in the pouch. Moreover, the cesophagus may have been permanently narrowed at its begin-

ning, its mucous membrane being just enough altered to cause the constriction and to become itself fragile. But if there were such changes in the mucous membrane, none were noticeable in the muscular layers, for they seemed not abnormal. It appears, on the whole, likely that the theory already suggested in considering the diagnosis is true, viz., that extensive changes in the œsophageal wall resulted in constriction and sacculatation; that the usual course of pouch-formation took place; that as soon as there was a distinct bulging the effect of the constriction became greater; that, finally, deglutition became even more difficult than in ordinary cases of diverticulum, because of the combined effects of pouch and of stricture.

Besides being at a loss to understand the lesion, I was much perplexed as to how to remedy it. Two methods were available,—the one to perform some plastic operation upon the stricture, the other to leave a large tube in the œsophagus. By a plastic operation, the stricture might be permanently relieved after the Heinecke-Mikulicz method of pyloroplasty; or the strictured portion might be thoroughly excised and an end-to-end suture made between pharynx and œsophagus. In case neither method was practicable, a portion of the sac might be utilized to increase the œsophageal lumen at the level of constriction.

Neither of the first two methods seemed applicable to this case. Linear œsophagoplasty was prevented by the want of laxity in both pharynx and œsophagus. Moreover, the mouth of the sac was in the way. Complete resection of the œsophagus, including enough to remove both constriction and sac margin, was inadvisable for the same reason. It seemed best, therefore, as already described, to utilize a portion of the pouch to furnish a new posterior wall to the œsophagus at the level of the constriction (Figs. 9 and 10).

Of the treatment of œsophageal diverticula, Von Ziemssen and Zenker wrote in 1878 (see "Cyclopædia of the Practice of Medicine," by Von Ziemssen, Vol. viii, page 89) :

"The radical cure of diverticula by operative procedure from without is at the present time one of our vain wishes;

yet we should hope that even this operation, conducted on Lister's plan, might at some future day be performed without danger. Nothing is to be hoped from attempts to destroy the diverticula by the introduction of astringent or irritating materials through the pharynx,—at least from our experience thus far, and from observation of the fact that we cannot, by compression or any other procedure, prevent the entrance of food, or of mucus and saliva, into the diverticulum, even for a short time."

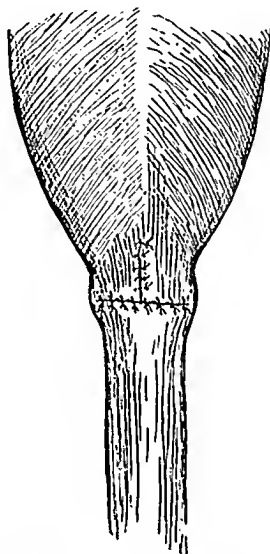


FIG. 10.—Showing esophagus and pharynx after vertical suturing of the pouch opening and transverse suturing of the esophageal slit. Case II.

The vain hope of Ziemssen and Zenker has become a reality: in the last twenty years some seventeen cases have been operated upon. Of these all have been successful but one. In the earlier operations the esophageal wound was kept open with a drainage-tube. In the later operations the esophagus has been immediately closed, the outer wound being packed temporarily with gauze. In one instance only have esophagus

and enter wound been immediately sutured; and this is the only case in which the wound has healed by first intention. On theoretical grounds there should be no greater dangers of extravasation in suture of the cesophagus than in suture of the intestine, except, perhaps, that the inverted tissues of the cesophagus do not adhere together so quickly and so firmly as the approximated peritoneal surfaces, so that extravasations are more likely to occur. The contents of the cesophagus, however, are not naturally as septic as the contents of the intestine, and the quantity of fluid escaping would be small. It is, moreover, possible to cleanse the cesophageal part of the operative field before operation by means of swabs, gargles, and mild antiseptics. Furthermore, the danger from local infection in the parts about the cesophagus is not as great as infections in the peritoneum. Though ultimate effect in cesophageal phlegmons may be quite as serious as in cases of general peritonitis, there is a better chance of remedying an accident in the former than in the latter.

The tendency of operations upon the cesophagus is to be more radical, and to trust more to the efficacy of immediate suture. The dangers of external cesophagotomy seem to depend more upon an already existing infection than upon a contamination at the time of the operation. I have successfully resected the pharynx in three or four cases for the removal of tumors. In these cases the field of operation was necessarily infected from the pharynx. The infection was, however, a mild one, and did not retard the healing of the drained wound. The only case of cesophagotomy for foreign body that I have had has been a fatal one.¹

In this case an insane woman swallowed an ordinary teaspoon. The spoon was thin, and had sharp edges. It became lodged in the cesophagus, pointing downward, with the bowl at the transverse portion of the aortic arch. I removed the

¹ Since this paragraph was written, I have removed successfully portions of a man's suspenders which he had swallowed with suicidal intent some fourteen days before operation. The buckles became caught at the level of the aorta, where they were demonstrated by means of the X-ray.

spoon by external œsophagotomy without difficulty and apparently without doing any harm. The wound was left open, with a tube in the œsophagus. The patient died in the course of two or three days. The cause of death was not discovered. There was neither abscess nor phlegmon. It may have been that, like many insane patients, she did not have the power of withstanding a severe operation.

Numerous cases of external œsophagotomy for foreign bodies show clearly the dangers of this procedure. As already stated, however, it should be borne in mind that, at the time of the operation, the chief dangers are already present, and that it is to relieve these, quite as much as to remove the foreign body, that the operation is performed.

In a search through literature on the subject of œsophageal diverticulum, Dr. D. F. Jones has found the total number of reported cases to be fifty-six. Excision was performed in thirteen of these cases. Including the cases herewith reported and the one reported by Hearne at the meeting of the American Surgical Association in 1899, sixteen have been operated upon by simple excision. Two have been operated upon by Girard by the method of inversion and suture. Most of these operations have been successful. Butlin reports an operation by a London surgeon whose patient died of suppression of urine after the removal of the diverticulum. Niehaus removed the sac fourteen days after a gastrostomy, with fatal result.

The cases of œsophageal diverticulum reported now number fifty-six.

The usual method of treating œsophageal diverticula has been by excision and suture. In the earlier cases, attempts were made to keep the œsophagus open by means of probangs. These palliative methods need no further consideration. To prevent starvation and to prolong life, when excision of the pouch is impracticable or impossible, recourse should be had to gastrostomy.

In favorable cases, after removal of the pouch, the œsophagus should be immediately sutured. If the external wound is tightly closed, it should be reopened at the first indication of

wound infection. As a rule, it seems the safer plan to use temporary wick drainage. In case of complications which permanently prevent deglutition, and thus endanger life through starvation, gastrostomy must be resorted to.

To avoid opening the œsophagus, Girard, of Berne, has twice invaginated the diverticulum, so that its internal surface projected into the œsophagus. In two cases operated upon in this way recovery followed. Such a procedure seems to me, however, not nearly so satisfactory as removal of the pouch. The inverted sac rests in the œsophagus, and cannot but obstruct it more or less. The orifice, which after inversion points externally, is closed by three layers of sutures. This leaves a blind space which may become filled with blood and cause serious obstruction, or may become septic. In Girard's cases, however, the pouch became shrivelled and atrophied, and no longer obstructed the passage of food. It would seem a more dangerous operation than the opening of the œsophagus. Inversion of the pouch would probably have been impossible in Case 11. Moreover, had inversion been successfully accomplished, the lumen of the œsophagus would undoubtedly have been completely obstructed. The method should, nevertheless, be considered as a practical resource in those cases in which, for any reason, excision and suture seem inadmissible.

The cause of pouches is unknown. It is by some thought to be congenital; by others to be a general weakening of the lower part of the pharynx and the upper part of the œsophagus in an area the least protected by muscular fibres. A small depression which here exists opposite the cricoid cartilage allows the momentary impaction of food. Constant swallowing, with temporary enlargement at this point, causes a bulging which after a while becomes so great that the food is permanently retained. The food remaining here causes the pouch to increase in size. With the increase in size the fundus of the pouch becomes thinner and thinner, as does rubber pellicle under pressure. When by sacculation the pouch has become pear-shaped, the enlargement is hastened by gravitation. As the fundus becomes more and more distended, its walls are cor-

respondingly thinned and weakened. One would therefore expect the pouch to increase more and more rapidly in both depth and capacity,—an expectation which clinical evidence justifies. The increase would doubtless be even more rapid than it is except for the restraints in the path of its enlargement.

The pathology of cesophageal diverticula shows that although they are called pressure diverticula, and though pressure is doubtless an etiological factor in connection with the presence of scar or other weakened tissues, yet a constriction of the cesophagus is not essential for their formation. Indeed, in all the cases hitherto reported no stricture has been found. Though strictures may not have an etiological influence in causing pulsion diverticula, they may, when situated low down, cause a general dilatation of the cesophagus.¹ From *a priori* reasoning, obstructions high up in the cesophagus cannot be without effect in the production of pressure pouches, for they cannot but increase the pressure. Changes in the lower pharynx and upper cesophagus which tend to result in bulging are unusual; a combination of the two would be extraordinary.

An interesting subject in connection with the operation is that of recurrence. Resection and suture necessarily leave scar-tissue at the very point where the bulging first started. Moreover, the condition of pharynx and cesophagus remains unchanged. So far as I am aware, however, there have been in these cases no recurrences after operation, although sufficient time has elapsed since the earlier ones for recurrences to take place.

¹ I have recently (March, 1900), operated upon a boy of eleven for impaction of the cesophagus with meat. The symptoms began after eating freely and hastily. There were abortive attempts at vomiting, and regurgitation of all fluids taken. The cervical portion of the cesophagus could be felt distended by a solid mass. I removed several mouthfuls of meat by means of long forceps, without clearing the cesophagus. The parents refused further treatment, and took the boy home. I believe that the whole cesophagus was obstructed, the original impaction taking place at the cardiac end.